MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2022/2023

BMM1014 – MATHEMATICS FOR MANAGERS

(All Sections/Groups)

06 JULY 2023
09.00 a.m - 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages with 4 questions only.
2. Attempt all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. Formulae are attached at the end of the question paper.

QUESTION 1

a) A local coffee shop, "Caffeine Fix," has estimated that its monthly fixed costs are RM 5,000. The variable cost of producing a cup of coffee is RM 2, and the shop sells each cup for RM 4. The owner has estimated that the shop can sell up to 10,000 cups of coffee per month.

i. Determine the number of cups of coffee the shop needs to sell each month to break even.

(3 marks)

ii. Determine the monthly profit or loss when the number of cups of coffee sold is 6,000.

(3 marks)

iii. If the owner wants to make a profit of RM 10,000 per month, how many cups of coffee does the shop need to sell each month?

(3 marks)

iv. If the owner wants to make a profit of RM 10,000 per month and the shop is able to sell up to 12,000 cups of coffee per month, what should be the selling price per cup?

(3 marks)

b) A furniture manufacturer produces three types of chairs: armchairs, recliners, and rockers. The production process involves three stages: cutting, assembly, and finishing. Each stage takes a certain amount of time for each type of chair. The following table shows the time required for each stage:

Chair Type	Armchair	Recliner	Rocker
Cutting Time (hours)	1	2	3
Assembly Time (hours)	2	3	1
Finishing Time (hours)	3	2	1

The manufacturer has 154 hours available for cutting, 121 hours available for assembly, and 110 hours available for finishing. Determine the number of each type of chair the manufacturer should produce.

(13 marks)

(Total: 25 marks)

Continued...

QUESTION 2

A restaurant in Melaka offers two types of meals, a vegetarian meal and a non-vegetarian meal. The restaurant has 40 kg of vegetables, 20 kg of meat, and 20 kg of rice available for the meals. Each vegetarian meal requires 0.5 kg of vegetables and 0.25 kg of rice, while each non-vegetarian meal requires 0.25 kg of vegetables, 0.5 kg of meat, and 0.25 kg of rice. The profit for each vegetarian meal is RM 10 and for each non-vegetarian meal is RM 15.

a) Formulate the above problem as a Linear Programming problem.

(6 marks)

b) Graph and show the feasible region of the above problem clearly.

(5 marks)

c) Find the optimal solution and the associated maximum total profit.

(11 marks)

d) What would be the effect on the optimal solution if the profit of the vegetarian meal has increased from RM 10 to RM 13?

(3 marks)

(Total: 25 marks)

Continued...

QUESTION 3

a) Mr. Ali deposited RM 5,000 into his savings account for 4 years with simple interest rate of 4% per annum. What is the total amount he has in his account after 4 years?

(4 marks)

b) A company invested RM 50,000 in a project that yields a continuous rate of return of 8% per annum. Calculate the total amount of money the company will have after 3 years.

(5 marks)

c) An individual plans to save money to purchase a car in 7 years. They want to save RM 1,000 at the end of each month in a savings account that pays a 4% interest rate per annum. How much money will the individual have at the end of 7 years, assuming the interest is compounded monthly?

(6 marks)

d) A company borrows RM 100,000 from a bank at an interest rate of 8% per annum compounded monthly for a term of 5 years. The loan is to be repaid through equal monthly instalments of principal and interest.

i. What is the amount of each monthly instalment?

(6 marks)

ii. How much total interest will the company pay over the life of the loan?

(4 marks)

(Total: 25 marks)

Continued...

QUESTION 4

a) Evaluate the indefinite integral.

$$\int 9x^8(10 - x^9)^3 \, dx$$

(6 marks)

b) ABC Sdn Bhd is a manufacturer of a certain product in Malaysia. The company determines that in order to sell x units of the product, the price per unit must be $p = 2300 - 1.5x$. The total cost of producing x units of the product is given by the function

$$C(x) = 20000 + 101x$$

Determine the quantity of the product that ABC Sdn Bhd should produce and sell in order to maximize profit. What is the maximum profit?

(6 marks)

c) Smart Electronics Sdn Bhd produces two types of earphones: model A and model B. The total cost required to produce x thousand units of model A and y thousand units of model B is given by

$$C(x, y) = 5x^2 + 8y^2 + 3xy - 4x - 100y - 14$$

The total revenue generated from selling these two models of earphones is approximated by

$$R(x, y) = 62x + 101y$$

How many units of each model of earphone should Smart Electronics produce to maximize its profit? What is the maximum profit?

(13 marks)

(Total: 25 marks)

Continued...

LIST OF FORMULA

1. Quadratic Formula

The solution of the equation:
$ax^2 + bx + c = 0$,
$a \neq 0$, are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Simple Interest

Interest, $I = Prt$ (P = principal, r = interest rate, t = number of years)
Accumulated amount, $A = P(1 + rt)$

3. Compound Interest

Accumulated amount, $A = P(1 + i)^n$, where $i = r/m$, and $n = mt$ (m = number of conversion periods per year)

4. Continuous Compound Interest

$A = Pe^{rt}$

5. Effective Rate of Interest

$r_{eff} = (1 + r/m)^m - 1$

6. Present Value for Compound Interest

$P = A(1 + i)^{-n}$

7. Future Value of an Annuity

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$

(S = future value of ordinary annuity of n payments of R dollars periodic payment)

8. Present Value of an Annuity

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

(P = present value of ordinary annuity of n payments of R dollars periodic payment)

Continued...

9. Amortization Formula

$$R = \left[\frac{Pi}{1-(1+i)^{-n}} \right]$$

(R = periodic payment on a loan of P dollars to be amortized over n periods)

10. Sinking Fund Formula

$$R = \left[\frac{Si}{(1+i)^{n}-1} \right]$$

(R = periodic payment required to accumulate S dollars over n periods)

11. Break-even point = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$ (Contribution per unit = unit selling price – unit variable cost)

Sales (unit) = $\frac{\text{Fixed cost + Target profit}}{\text{Contribution per unit}}$

Calculus

12. Product rule

$$f(x) = u(x).v(x)$$

$$f'(x) = u(x).\frac{dv}{dx} + v(x).\frac{du}{dx}$$

13. Quotient rule

$$f(x) = \frac{u(x)}{v(x)}$$

$$f'(x) = \frac{v(x)\frac{du}{dx} - u(x)\frac{dv}{dx}}{[v(x)]^2}$$

End of Paper